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Method for controlling devices connected to a central controller, and a corresponding controller

The invention relates to a method for controlling devices  
5 connected to a central controller, and a corresponding controller, control commands from an existing set of control commands being determined automatically.

10 Prior art

Video/audio consumer electronic devices are connected by means of standardized plug-in connections. The SCART connection is customary for this in Europe. The following abbreviations are used below:

TV Television set  
CDP Compact disc player or DVD player  
VCR Video recorder or CDP capable of recording on discs  
IRD Integrated receiver decoder or set-top box  
20 PC Computer  
IR Infrared  
OSD On-screen display

The IRD from Nokia ('d-Box') offers a possibility of controlling a VCR via transmitted infrared commands. For this purpose, the manufacturer of the VCR must be specified by means of a menu. Subsequently, several test runs are made in order to detect the users VCR which is present. If the operator finds that his VCR has reacted, he must acknowledge  
30 this, so that no further test run is started. Selection or assignment of devices is thus fixed by the user. However, this method does not function satisfactorily under all conditions. Although a VCR can be controlled in the test run, the test data confirmed are not further used after the test  
35 run.

## Invention

With the increasing variety of existing devices such as TV, VCR, PC, CDP, videocamera it is necessary for the user to have at his disposal a uniform control and operating system. This system permits individual devices to be detected automatically, in order then to be able to control them with a uniform, conclusive concept, that is to say by means of a remote control possibly with OSD.

10 It is the object of the invention to specify a method for automatically including devices into a uniform control and operating system, in which both the type of device and the specific manufacturer's type of device, or the IR code  
15 thereof, is automatically detected, and thus the precondition is provided for uniform control. This object is achieved by means of the method specified in Claim 1.

It is further the object of the invention to specify a device for applying the method according to the invention. This object is achieved by means of the device specified in Claim 9.

25 The invention permits the user to add on new devices or exchange old devices for new ones, without having to look at their specific operating approach.

A central controller, for example a TV or a PC, is connected, on the one hand, to the central controller by means of lines for video and/or audio signals and/or switching voltages, for example, and, on the other hand, to further devices, which are controlled by this central controller, for the purpose of transmitting control commands by means of a cable connection or via an IR link. These further devices can be, for example, a VCR and/or an IRD and/or, in the case of the PC as central controller, a TV. In the case of the IR link, the central controller constitutes a wireless connection to the individual devices by means of a IR transmitter. The installation process with automatic detection of the connected devices is carried out in principle as follows:

- 1) The device to be controlled is connected to the central controller by means of a SCART line or other lines for video and/or audio signals. In the case of digital devices, these lines can contain, for example, a standardized bus.
- 5 2) The device to be controlled must be switched in stand-by mode or power-on mode, or be capable of being switched in to the appropriate state by an IR command.
- 3) In the case of a VCR or player for another medium - such as, for example, an optical disc - as the device to be controlled, either an empty cassette or empty medium or a recorded, but recordable cassette or a recorded medium must be inserted so that the test reaction to a record and/or play command can be determined.
- 10 4) When the central controller is switched on or by menu selection on the central controller, a device configuration routine is now automatically started, which tests, to which SCART outputs/inputs of the central controller devices are connected. For this purpose, the output impedance of the video lines of the SCART connection are measured, for example.
- 15 20 5) Previously known IR codes for different devices or manufacturer's types of this type of device are now transmitted, and the reactions at corresponding inputs of the occupied SCART outputs/inputs are tested.
- 25 6) With the determined reactions to the transmitted IR code at the SCART inputs of the central controller, selection of type of device is made in the central controller for the respective SCART output/input.
- 7) Should a unique identification of the connected device not be possible - for example in the case of several variants of devices with the same code, in particular given the same manufacturer - the user is offered the devices under consideration in a menu, if this is necessary for the device which is to be controlled. In the case of devices of different makes which are identical in design or function, there is frequently no need for a unique identification.
- 30 35 8) The user can be provided with the possibility of permitting a check routine to run each time the central controller is switched on. Said routine then uses IR codes al-

ready determined for the purpose of checking whether the stored device configuration is still valid. This option can also be switched off by means of a software menu, or run only at the command of the user. If only the SCART occupancy  
5 has changed due to exchange or removal of devices, this is automatically taken into account by the central controller. A software update can be enabled in order to update the IR codes stored in the central controller. In the case of a PC as central controller, this can be performed by a diskette  
10 or by loading by means of a telephone line modem. In the case of a TV or a digital video and/or audio receiver as central controller, loading can be performed by means of a telephone line modem (advantageously in the case of pay TV or pay audio) or via the transmitter channel (satellite, ca-  
15 ble, terrestrial) of a video and/or audio signal. Software concepts which have such download capabilities are already being introduced onto market, for example Open TV from Thomson/Sun Interactive. There are companies such as, for example, Universal Electronic Inc., USA, which market data on IR  
20 codes, including data on european IR codes.

What is concerned here in principle is a method for controlling devices connector to a central controller, it being possible for test signals to be led from the central con-  
25 troller to the connected devices and/or from the connected devices to the central controller, and the connected devices being controlled from the central controller by means of associated, fixed control commands, it being the case that automatically by means of signal variations, caused by supply impedances of connected devices, on lines for the test  
30 signals, or by means of measuring corresponding output impedances at terminals of the central controller and/or automatically by checking presence or absence of test signals on the basis of transmitting test control commands from the  
35 central controller to the connected devices, it is detected of what type the connected devices are and to which terminals of the central controller they are connected and in that on the basis of the type determined a set, stored in a central controller, of associated, fixed control commands

for the corresponding connected device is selected when selecting one of the terminals.

Advantageous developments of the method according to the invention follow from the associated dependent claims.

- 5 What is concerned here in principle is a central controller having devices connected thereto, in which test signals can be led to the connected devices and/or from the connected devices to the central controller, and which controls the connected devices by means of associated, fixed control com-  
10 mands, with means which automatically determine the signal variations, caused by the supply impedances of connected devices, on lines for the test signals, or automatically determine corresponding output impedances at the terminals of the central controller, and/or which automatically deter-  
15 mine, by checking the presence or absence of test signals on the basis of transmitting test control commands to the connected devices, of which type the connected devices are and to which terminals of the central controller they are connected and which, on the basis of the type determined, se-  
20 lect a set, stored in a central controller, of associated, fixed control commands for the corresponding connected device when selecting one of the terminals.

Advantageous developments of the device according to the in-  
25 vention follow from the associated dependent claims.

### Drawings

- 30 Exemplary embodiments of the invention are described with the aid of the drawings, in which:  
Figure 1 shows a possible configuration in which a TV set takes over the central control;  
Figure 2 shows a flowchart of the interrogation control for  
35 automatically detecting the devices connected to the central controller.

Exemplary embodiments

As already indicated above, it will be possible in future to use buses or other hardware connections between the participating devices. The advantage of the SCART connections or corresponding connections is that devices already existing today can be used. Future buses could be:

IEEE 1394 High Performance Serial Bus

IEEE Standards Department

445 Hoes Lane, P.O. Box 1331  
Piscataway, NJ 8855-1331, USA

Universal Serial Bus (USB)

Computer ACCESS Technology Corporation

3375 Scott BLVD., Suite 410  
Santa Clara, CA 95054

AV-Link (prEN 50157-1)

CENELEC

Central Secretariat  
Rue de Stassart 35  
B-1050 Brussels

Figure 1 shows a TV set CU as central controller. CU contains an internal controller CUS with appropriate software. The commands output by a central remote control REMC are amplified by an IR receiver and possibly decoded and relayed to CUS. CU is connected via a first SCART connection SCART1 to a video recorder VCR, and the latter is connected in turn to a first satellite decoder IRD1. IRD1 can also be connected directly to CU by a further SCART connection. CU is connected via a second SCART connection SCART 2 to a second satellite decoder IRD2. The internal controllers VCRS, IRD1S and IRD2S with the associated software belong to VCR, IRD1 and IRD2. Said internal controllers are connected, in turn, in each case to an associated IR receiver IRVCR, IRIRD1 and IRIRD2. IRTR transmits its IR commands IR-C to IRVCRS, IRIRD1S and IRIRD2S.

The steps specified in curly brackets below refer to the flowchart in Figure 2. After the CU {201} is switched on, a check is made {204} as to which SCART terminals of CU are connected to another device. The  $75\Omega$  impedance of video inputs of the connected devices, for example, can be used for this check, since in the case of loading of the corresponding  $75\Omega$ -CU output with  $75\Omega$  half the unloaded CU output voltage drops at this impedance. On the basis of specific commands, for example play, some devices, for example VCRs, generate a switching voltage on one of the SCART lines, which switches-over the connected device from normal mode to a mode for playing the VCR signals. Such switching voltages can likewise or additionally be evaluated for liable detection. Instead of the  $75\Omega$ -input and output impedance of video lines, or in addition thereto, it is also possible to use the  $1k\Omega$ -output impedance and  $10k\Omega$ -input impedance of audio lines in a corresponding way. Should no SCART connections be occupied, there is no need for an installation routine. Configuration inputs possibly present in storage means of CU can then be cleared {202}

However, should there be occupancy of SCART connections of CU, the devices entered correspondingly in a SCART occupancy list in CSU transmit the associated IR codes for the purpose of unique identification {206}. If the reactions at the associated SCART video inputs and/or switching voltage inputs of CU is as expected {207}, that is to say in accordance with the current SCART occupancy list, there is no need {2} for a new installation {211}. If reactions occur {205} to the transmitted IR codes on other SCART sockets or SCART terminals of CU, the customer has exchanged a SCART connection or devices. This exchange is noted {214} in the occupancy list, and a new installation for testing of valid IR codes is not required. However, should the SCART occupancy not be uniquely detectable, a new installation {211} is required for the corresponding SCART terminals.

Data on preferably all known IR codes of devices which can be connected peripherally are available for the new installation {211} in an IR code list or in several such lists.

This list or these lists are expediently sorted according to

the number of the devices respectively purchased, in order for the devices to be detected as quickly as possible. The associated pointer to the IR code data for a specific device to be controlled is reset {216} at the start of the new installation. The interrogation of a reaction to an IR code is carried out sequentially on all SCART sockets which are to be tested, that is to say occupied in an unknown way. At first, no video output signal is fed {241} to the SCART socket to be tested.

10 The IR code 'ON' and, if present, 'AV' of the first device in the IR code list is now transmitted {242}. If a video input signal can be detected {243} at the respective SCART socket, the device can only be an IRD, which transmits a decoded transmission or a menu, or is a CDP with menu, that is to say with OSD. A VCR or conventional pay TV decoder would feed back only a noise signal on the basis of the AV command.

It is now assumed that an IRD or CDP with OSD is present.

20 After the reaction to ON has been detected, the 'PLAY' code is now, and thereafter the 'STOP' code of the same device are transmitted {237, 238}. Following upon 'PLAY', in accordance with the SCART standard a switching signal (blanking) is activated at Pin 8 of the SCART socket. Whether this signal is also deactivated {235} after the STOP signal, is frequently specific to the device or manufacturer, and thus the further selection criterion for the correct IR code.

If, after this test several types of device should still come into consideration, which do not coincide in function and associated IR code, the user is offered a menu {234, 236} in which a final decision is then taken for a specific device. In the case of several devices the same function and IR code and of different makes or manufacturers, it is advantageous that no unique assignment is required if CU is capable of calling or monitoring all functions.

35

It will now be assumed below that the VCR or conventional pay TV decoder is present. After it has been attempted to switch the device to 'AV', and no video input signal is pre-

- sent at the SCART socket {243}, CU then sends a video output signal to the SCART socket {244}. A corresponding video input signal is set up at the SCART socket when the device is a VCR or a conventional pay TV decoder with the corresponding IR code {245}. If this is not the case, the test routine is abandoned and the next SCART socket or the next IR code is tested. Otherwise, VCR and conventional pay TV decoder are distinguished {254} by a dedicated recording {246, 247} with subsequent playback monitoring {251-253}. In the case of a VCR, further distinction is possible {256} by means of the switching signal at Pin 8 after the STOP signal. Thereafter, a menu appears, as described above, if it has still not been possible to determine the required information automatically.
- 15 In the case of a conventional pay TV decoder, there is present at the SCART output thereof in this test state a scrambled video signal, of which it is assumed, that the decoder could also actually decode it if it reacts with a switching voltage at Pin 8 of the SCART connection. Since such a decoder is, however, a rather passive device without further required IR code control commands, the finding that it is functioning and to which SCART socket it is connected is already sufficient, without the need further to identify the exact type of the device. It could only further be checked, whether the device is also capable of decoding several sources or types of source signals. There could then be a need for an IR code control command for selecting the source and/or source signal type.
- 30 The detected device is entered in the occupancy list {266}. If this list is not yet complete (the size of the list depends on the number of occupied SCART sockets), the next SCART socket is interrogated {261} or a new IR code is transmitted.
- 35 Once the end of the IR code list has been reached, without the type of device or the SCART socket occupancy having been definitely determined, only an older CDP without OSD can be concerned, or an unknown, possibly entirely new device.

In order to find out whether an older CDP without OSD is concerned, the CDP is tested {225, 228} for reactions to the IR code PLAY command. Here, as well, the interrogation of the switching voltage at Pin 8 {231} is a further distinguishing feature.

If an assignment is still not yet possible at this point, the automatic detection or new installation routine is left. The type of device is input by the operator, and the occupancy list and the IR code list is correspondingly updated.

The reference symbols have the following meaning in Figure 2:

- 201 switch on CU
- 15 202 clear possible entry in SCART occupancy list
- 203 END
- 204 SCART socket occupied?
- 205 SCART sockets occupancy as previously?
- 206 transmit IR code of devices detected earlier
- 20 207 reaction at SCART as expected?
- 208 END
- 211 New installation
- 212 transmit IR code of devices detected earlier
- 213 SCART socket occupancy as previously?
- 25 214 exchange places in the SCART occupancy list
- 215 END
- 216 reset pointer for code list 1
- 217 pointer at end of code list 1?
- 218 reset pointer for socket n-1 in SCART occupancy list
- 30 220 END
- 221 reset pointer for code list 2
- 222 increment pointer for code list 2
- 223 pointer at the end of code list 2?
- 224 reset pointer for socket n-1 in SCART occupancy list
- 35 225 transmit PLAY IR code
- 226 increment pointer for SCART occupancy list
- 227 was SCART socket n tested?
- 228 video and/or audio signal present at input of SCART socket n?

- 229 transmit STOP IR code
- 231 switching signal present at Pin 8 of the SCART socket  
n?
- 232 CDP detected? otherwise display selection list
- 5 233 CDP detected? otherwise display selection list
- 234 CDP detected? otherwise display selection list
- 235 switching signal present at pin 8 of the SCART socket  
n?
- 236 CDP/IRD detected? Otherwise display selection list
- 10 237 transmit PLAY IR code
- 238 transmit STOP IR code
- 241 apply no video and/or audio signal at the output of  
SCART socket n
- 242 transmit ON and AV IR code
- 15 243 video and/or audio signal present at the input of SCART  
socket n?
- 244 supply video and/or audio signal at output of SCART  
sockets
- 245 video and/or audio signal present at input of SCART  
20 socket n?
- 246 transmit RECORD IR code
- 247 transmit STOP IR code
- 248 apply no video and/or audio signal at output of SCART  
socket n
- 25 251 transmit REWIND IR code
- 252 transmit STOP IR code
- 253 transmit PLAY IR code
- 254 video and/or audio signal present at input of SCART  
socket n?
- 30 255 transmit STOP IR code
- 256 switching signal present at Pin 8 of the SCART socket  
n?
- 257 VCR detected? otherwise display selection list
- 258 VCR detected? otherwise display selection list
- 35 261 increment pointer for code list 1
- 262 increment pointer for SCART occupancy list
- 263 SCART socket n tested?
- 264 scrambled video and/or audio signals at the SCART  
socket output

- 265 switching signal present at Pin 8 of the SCART socket  
n?
- 266 enter occupancy of SCART socket n in SCART occupancy  
list
- 5 267 SCART occupancy complete?
- 268 END

In the case of interrogation, Y signifies 'YES' and N signifies 'NO'.

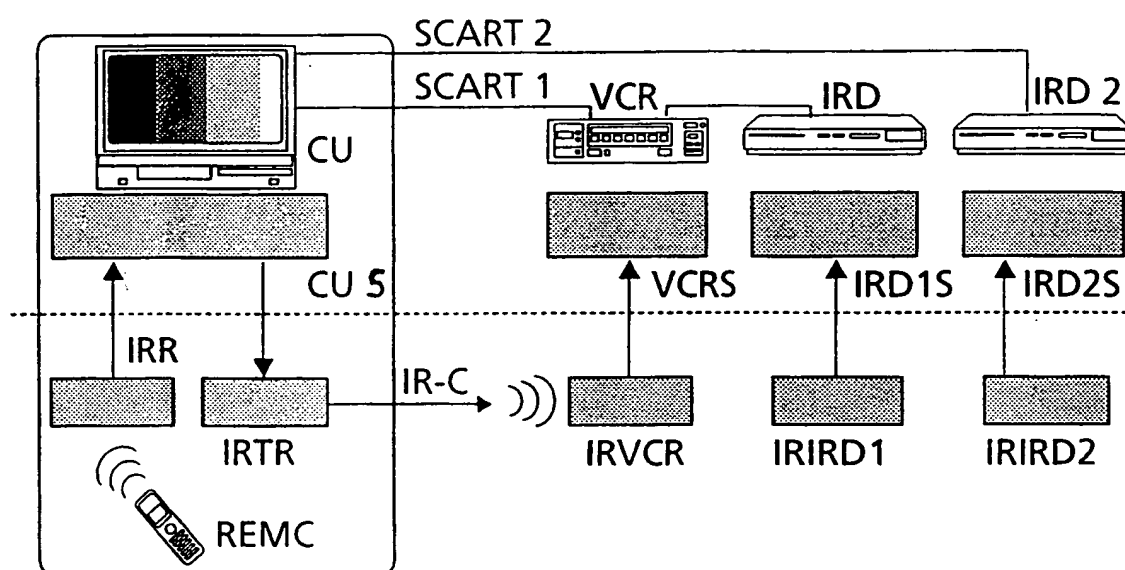
- 10 Steps 221-233 relate to a CDP without OSD. The steps 234-238 relate to a CDP with OSD or to an IRD. The steps 244-254 relate to a VCR and a conventional pay TV decoder. The steps 255-258 relate to a VCR. The steps 264 and 265 relate to a conventional pay TV decoder.

Claims

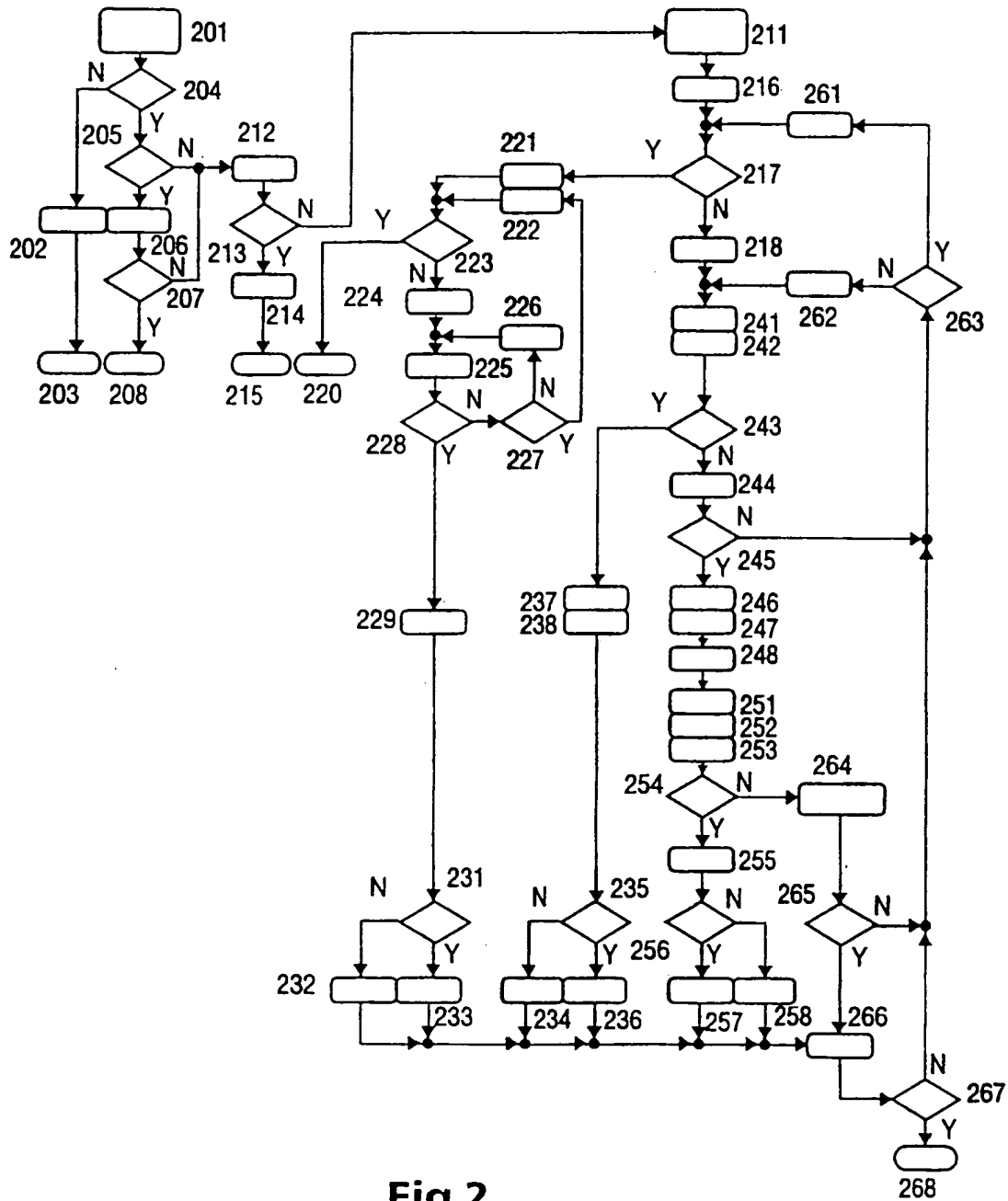
1. Method for controlling devices (VCR, IRD1, IRD2) connected to a central controller (CU), it being possible  
5 for test signals (IR-C) to be led from the central controller to the connected devices and/or from the connected devices to the central controller, and the connected devices being controlled from the central controller by means of associated, fixed control commands (IR-C), characterized in that automatically by means of signal variations, caused by supply impedances of connected  
10 devices, on lines (SCART1, SCART2) for the test signals, or by means of measuring corresponding output impedances at terminals of the central controller and/or automatically by checking presence or absence of test signals on  
15 the basis of transmitting test control commands from the central controller to the connected devices, it is detected of what type the connected devices are and to which terminals of the central controller they are connected and in that on the basis of the type determined a  
20 set, stored in a central controller, of associated, fixed control commands for the corresponding connected device is selected when selecting one of the terminals.
- 25 2. Method according to Claim 1, in which the test signals are video, audio and/or switching signals.
3. Method according to Claim 1 or 2, in which the fixed test control commands and control commands are IR code commands (IR-C).  
30
4. Method according to one or more of Claims 1 to 3, in which the central controller is a television set or a computer.  
35
5. Method according to one or more of Claims 1 to 4, in which the terminals of the central controller are SCART terminals.

6. Method according to one or more of Claims 1 to 5, in which the signal variations on the lines (SCART1, SCART2) for the test signals are voltage drops.
- 5 7. Method according to one or more of Claims 1 to 6, in which for the case that the type of a device cannot be determined automatically a user selects the type of device and/or the set of associated, fixed control commands (IR-C).
- 10 8. Method according to one or more of Claims 1 to 7, in which the determination of which type the connected devices are and/or to which terminals of the central controller they are connected and/or the selection of the set, stored in the central controller, of fixed control commands is carried out automatically when switching on the central controller.
- 15 9. Central controller (CU) having devices (VCR, IRD1, IRD2) connected thereto, in which test signals (IR-C) can be led to the connected devices and/or from the connected devices to the central controller, and which controls the connected devices by means of associated, fixed control commands (IR-C), characterized by means (CU, CUS) which automatically determine the signal variations, caused by the supply impedances of connected devices, on lines (SCART1, SCART 2) for the test signals, or automatically determine corresponding output impedances at terminals of the central controller, and/or which automatically determine, by checking the presence or absence of test signals on the basis of transmitting test control commands to the connected devices, of which type the connected devices are and to which terminals of the central controller they are connected and which, on the basis of the type determined, select a set, stored in a central controller, of associated, fixed control commands for the corresponding connected device when selecting one of the terminals.
- 20 25 30 35

1/2

**Fig.1**

2/2



**Fig.2**

# INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/EP 98/07273

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04B1/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04B H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 130 036 A (RCA CORP) 2 January 1985 see page 4, line 23 - page 6, line 34 ---	1,9
A	EP 0 588 423 A (D2B SYSTEMS CO LTD) 23 March 1994 see abstract; figure 1 ---	1-9
A	GUTZWILLER: "Control Networks for the Home" MACHINE DESIGN, vol. 55, no. 24, October 1983, pages 109-112, XP002063911 CLEVELAND, OH, US -----	

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 98/07273

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